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ABSTRACT

This review of research on class size is organized into two parts. Part 1 presents a summary list of true statements with respect to the central topic of this study. The statements are divided into three sections: (a) class size and pupil achievement, (b) class size and teaching procedures, and (c) teacher load. Some statements can be accepted as facts; others should be considered as contentions, not well supported by research or by any consensus in the literature. It is noted in part 1 whether the statement is being presented as a fact or contention; each statement is accompanied by references to part 2, where support for the statement can be found. Part 2 contains an analysis of the research on (a) terms and definitions in this area, (b) findings with respect to class size and pupil achievement, (c) studies of class size and teaching processes, (d) teacher load and its relationship to instruction, and (e) the law and contractual precedents on this issue in the state of Connecticut. (Author/JA)

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CLASS SIZE

AND

TEACHER LOAD

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In 1972, NESDEC was commissioned by the Weston, Connecticut Board of Education to conduct a review of the existing research relating to class size and teacher class load. The results of that effort, contained herein, were judged to be of such significance that the NESDEC Executive Committee encouraged that they be shared with all member school districts. The study represents an attempt to put into perspective a potentially highly volatile issue. It was our intent in conducting the study, and in remitting the results, to forward and not impede the cause of public education in New England.

The major work of the study was done personally by William F. Murphy, Director of Field Services at NESDEC. He was assisted by members of the Study Team as acknowledged herein.

The report is replete with warnings about the misuses to which it or some of its parts could be subject. NESDEC is prepared to exhaust every means to insure that this does not occur. It is our hope that it will bring together teachers, School Committee members, administrators and other educators to discuss an extremely important topic.

John R. Sullivan, Jr.
Executive Secretary, NESDEC

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INTRODUCTION

The purpose of this report was to present to the Weston, Connecticut Board of Education a true account of the research findings on the question of class size as an educational variable and information on related issues bearing on the present and future policies of the Board. Every effort has been made to render an accurate summary of major research efforts and the conclusions drawn from them, irrespective of the nature of those conclusions. Where judgments are made and opinions offered, these should be recognizable as such. If at any point the judgments or advisories offered were perceived as in conflict with the interests of the Weston Board, the school administrators, the teaching staff, or the townspeople, it was not the purpose of the study staff to sustain or defeat the interests of any group. The only bias felt by the Study Team, in keeping with the ethics of the education profession and the historic position of NESDEC, was a primary dedication to the total welfare of all children in the schools of New England.

Decisions reached about class size and teacher load, like most major issues of policy, could have an important effect upon the learning environment provided for children. Without a policy derived from research in education, developmental psychology, and the behavioral sciences, an unbridled and unconscionable injustice could be foisted upon children and teachers alike. With a policy founded upon convenience

or expediency, there can develop in the schools a codification of teaching practice and an inflexibility of operation that could impede pedagogical progress and regiment curriculum and instruction in a way no less damaging to the welfare of children and teachers alike. Since the present and future well-being of children is the primary interest of the Board of Education, the school administration, the teaching faculty, and the citizens of Weston, the interests of all groups should be best served by an exposition of the truth. We believe that the truth about class size and teacher load, to the extent that the truth is known, is the best recourse for both professional educators and responsible laymen.

I.

SUMMARY STATEMENTS OF FACTS AND CONTENTIONS

Research and discussion of the issues of class size, pupil-teacher ratios, and teacher load have appeared in educational literature since the turn of the century. Over 300 such reports and discussions can be found, but well over 200 were dismissed by Blake (1954) either because the article in question represented the private judgment of the writer or because the reported research was poorly designed. An estimate of the number of acceptable studies on class size and related issues, including the 22 accepted by Blake, would not exceed 60, covering the educational range from kindergarten through college. Of those 60, not more than a handful meet contemporary requirements with respect to research design and statistical and practical validity. Nonetheless, since instances of perfectly designed research are relatively rare in the social sciences anyway, it seems wise to attend the information and findings in the better studies while making allowances for the shortcomings. The research reports and discussions of research analyzed by the NESDEC Study Team were those that offered the most definitive findings and additive contributions to the central issues in question.

This review of the research on class size is organized into two parts. This section, Part I, presents a summary list of true statements with respect to the central topics of the study. Some statements can be accepted as facts; others should be considered as contentions, not well supported by research or

by the consensus of opinion in the literature. Each statement is accompanied by references to Part II where support for the statement can be found. Part II of the study comprises an analysis of the research upon (A) terms and definitions in this area; (B) findings with respect to class size and pupil achievement; (C) studies of class size and teaching processes; (D) teacher load and its relationship to instruction; and (E) the law and contractual precedents on this issue in the State of Connecticut.

In brief, this report is designed to present:

1. Concise statements of the facts and of relevant contentions with respect to the issues of class size and teacher load.
2. Descriptions and analyses of the research evidence that tend to support these facts and contentions.

FACTS AND CONTENTIONS

Fact Contention	STATEMENT	Text page
	I. CLASS SIZE AND PUPIL ACHIEVEMENT	
1. Fact	There is no optimum class size, in terms of either pupil achievement or teaching processes.	31, 35, 40
2. Fact	Misleading statements claiming a positive relationship between class size and pupil achievement are sometimes made.	32
3. Fact	Research on the effects of class size on pupil achievement is contradictory and inconclusive.	15, 28 35
4. Fact	Class size may have no effect at all upon achievement.	23-25, 28, 31, 33

Fact Contention	STATEMENT	Text page
5. Fact	Much of the research upon class size finds that students in large classes achieve more than those in small classes.	15
6. Fact	Research indicates that superior achievement in English occurs more often in large classes.	15, 16, 17, 18
7. Fact	Research indicates that superior achievement in mathematics occurs more often in large classes.	16, 17, 18
8. Fact	Achievement in reading improves in small classes, mainly for low I.Q. white children and for all non-white children.	18, 19, 22, 23
9. Fact	The mandate in Connecticut to negotiate class size does not require a contractual provision on the question of class size.	53
10. Fact	Class size and teacher load are frequently expressed as a pupil-teacher ratio or by a numerical staff adequacy statistic (NSA).	13, 34, 39
11. Contention	Numerical staff adequacy is judged by many to be a better indicator of quality education than is class size.	39
12. Fact	Class size is a matter of concern to teachers.	32
13. Fact	Smaller class size frequently contributes to better teacher morale.	38
14. Contention	Informing teachers in advance of class size policy—and perhaps joint planning on class size—may produce more "good practices" than when teachers are not informed. This may apply whether class size is reduced or increased.	39

	Fact Contention	STATEMENT	Text page
15.	Contention	Class size that deviates markedly from what would be expected in light of the financial capability of the community tends to produce negative results.	40

II. CLASS SIZE AND TEACHING PROCESSES

1.	Fact	To be educationally sound, class size must vary to match the objectives and the methods chosen.	47, 48
2.	Fact	The claims made for optimum class size made by IAR researchers are based almost entirely upon presumably desirable classroom activities, not upon achievement.	41-44, 45-47
3.	Fact	If the teaching practices favored by IAR researchers can be accepted ipso facto as desirable, more such practices are found in small classes.	38-44
4.	Contention	Promising practices occur more often in small classes in English.	39
5.	Fact	The bulk of the research emphasizing small class size as a critical factor in quality of instruction emanated from a single source, the Institute for Administrative Research (IAR), Teachers College.	38-44
6.	Fact	The researchers at IAR have been accused of deliberate bias in the design of their research into the question of class size.	46

Fact Contention	STATEMENT	Text page
	III. TEACHER LOAD	
1. Fact	The choice of appropriate teacher load is an arbitrary one for lack of research evidence.	52
2. Fact	The mandate in Connecticut to negotiate teacher load does not require a contractual provision concerning teacher load.	55
3. Contention	The variety of tasks and extracurricular duties often performed by teachers totals approximately 45.	45
4. Fact	Statistics are available on general practices and trends in Connecticut and in the nation on class size and teacher load.	53
5. Contention	Teacher load has a negative effect upon pupil achievement.	50-52

II.

ANALYSIS OF THE RESEARCH

A. THE RESEARCH QUESTION AND PROBLEMS

This monograph is a review and critical analysis of the major research on class size reported prior to the year 1972. The research question usually asks the optimal class size for effective instruction, using as research measures either the achievement scores of students or the presence of teacher-pupil behaviors considered characteristic of effective instruction. The purpose of this review is to equip the reader who must deal with the issue of optimal class size with a knowledge of representative empirical studies of the question. Unfortunately, the possibility exists that some segment of this research on class size may be misconstrued by the reader, or worse yet, may be misused in the pursuit of a purportedly paramount objective. Incongruous as it may seem, therefore, it is necessary to introduce this review with a denial of the very question to which the research is addressed.

The Question: Optimal Class Size

The basic problem with most of the research on optimal class size is the question itself. The question of an optimal class size for effective instruction is an over-simplified one because it ignores the several determining variables inherent in all group instruction, however large or small the group may be. Among the major variables that may influence the outcomes of instruction are the subject matter, the objectives,

the ability of the students, the instructional techniques used, and the competence of the teacher. Not only are these factors as significant for the success of instruction as the factor of class size, but class size itself is inseparably related to each of these remaining variables in a way that refutes the meaning of research based upon the variable of class size alone.

Class Size and Related Variables

The subject matter to be taught frequently imposes certain restraints upon the size of the class, especially at the secondary school level. Though a school may have adopted a class size policy of 25 students per class or teacher, certain learning situations are limited to less than 25 students in common practice. Art, home economics, and laboratory classes in science are often limited to 20 students or to the number of student places available. Industrial arts classes may be scheduled for as few as 16 students, particularly in metal and auto-repair instruction. Classes for students with special needs may be restricted to as few as eight students, while classes in music and in physical education at any level may accommodate 35 or more students at a time. In other words, variations in class size for different subject disciplines are often judged to be necessary on the basis of experience.

The nature of the instructional objectives may warrant a departure from a general policy for class size. Most of the research on class size relies upon cognitive objectives and related measurements to determine an ostensibly optimal class size, except possibly for certain criteria in the research on class size and teaching processes. None of the research, however, attempts to measure the effect of class size upon student progress in the affective domain. School systems in increasing numbers have begun to turn their attention to the development of systematic affective objectives for students, accompanied by appropriate evaluative devices that will substantiate and verify the contributions of the school toward the personal and social maturity of the student. These efforts are aimed at codifying what competent teachers have always

recognized as integral consequences of instruction, i.e., the effects of the school experience upon the personal development of the child.

Of the many experiences that a child may have in school, none may have a more persistent effect upon his personal and social development than those experiences encountered in the course of classroom instruction. For each child, learning in the company of other children provides the setting for the development, or loss, of positive personal characteristics and of accepted social values and behaviors, depending in large part upon the measure of success or failure that befalls him in his cognitive learning tasks. Personal and social development, then, is inextricably related to the effectiveness of instruction toward cognitive objectives. Thus, the variables that influence the effectiveness of instruction for cognitive purposes necessarily bear also upon the psychological and social consequences of instruction for each child. Class size is one of these variables, and where school systems have established special classes for emotionally disabled children, the class size has been reduced substantially in most cases. As yet, however, the question of optimal class size for the positive affective development of normal children remains to be studied empirically. But again, unless this question is studied in association with the other major variables in instruction, the findings will be both meaningless and misleading.

Student characteristics, particularly age and ability, may greatly circumscribe the size of the class group. Age-grade appears as a variable in some studies of class size, and conclusions about class size are sometimes conditional upon the age-grade level of the students. The relationship of age alone to class size has not yet been reported in the literature, probably because the widespread practice of differentiating the sizes of primary-grade classes and of classes for older children is based more upon intuition than upon definitive and measurable assumptions. The fact that high school classes rarely attain the size of college and university lecture courses is likewise attributable to intuitive perceptions of developmental differences between the two age groups. Age as a variable in

instruction appears to be widely accepted as a salient and inseparable component of class size.

Learning ability is the second student characteristic that exerts considerable influence on class size. Where students of limited ability are grouped for instruction, it is common to diminish the size of the group to afford the teacher a greater opportunity to assist students who need more than average aid. Concomitantly, classes of more talented students in the subject may be enlarged because they are more able to learn without teacher assistance. Children who require special education may meet in classes with as few as eight students, and the learning objectives, teaching techniques, and other instructional variables are commonly modified, together with class size, to fit the limited capabilities of these children.

Perhaps the greatest doubt about a single optimal class size appears through the comparison of instructional techniques and environments to the number of learners permissible. Instruction entails the presentation of a stimulus situation, by the teacher or by the student himself, to which students will react in a particular response mode, e.g., by listening, writing, or talking. From a psycho-physical viewpoint, optimal class size is governed by the limitations of human perception and the behavioral dynamics of the stimulus-response modes used for learning. For example, a film can be exhibited for 25 students or, more efficiently, for 250 students without any loss in effectiveness, provided that all students can see and hear the film adequately. Similarly, a lecture can be given efficiently and effectively to a large group of students if all can hear the speaker well. On the other hand, a discussion cannot be held among 250 students if all are to participate and share in the dissemination of information and knowledge. The same is true of question-and-answer methods that depend upon the response of one student to provide feedback to others who made only covert responses and to provide information to students unable to respond at all. Other instructional techniques have comparable unique characteristics that impose practical limitations upon the size of the instructional group, particularly in light of the remaining intrinsic variables in instruction.

In summary, the argument appears valid that class size is not only one of several inseparable variables in instruction, but is also inextricably related to each of the remaining variables. This intimate association of variables in the total process of instruction raises serious doubts about the legitimacy of research based upon a single variable in isolation. With this realization in mind, the reader may be better equipped to evaluate the review that follows.

Definition of Terms

The research is further confounded by the internal problem of definition. The research on class size features a variety of terms with very little agreement as to precise use. Where there is agreement on term definition, there frequently exists confusion in the application of the term. Given an adequate level of precision in the terminology, it is not uncommon to encounter research findings based upon behavioral data quite remote from the conclusions drawn. Apprehension of this state of affairs requires a brief explication of these shortcomings as they appear in much of the research.

The literature on the question of class size and optimal learning conditions is confusing primarily because the terms in the literature vary in meaning from one research report to another. Particularly confounded are the basic concepts of "class" and "size." The definition of "class" is difficult to specify. The Research Division of the NEA in a survey of class sizes refers to "class" as "the number of pupils for whom a teacher is responsible in a self-contained classroom" (NEA, 1965). Other studies broaden and deepen the definition: "the number of pupils who are assigned to a given teacher, or group of teachers, for a given instructional period of time" (Halland and Galfo, 1964). In those research reports where the problem of definition is more fully recognized (e.g., Ross and McKenna, 1955), the question and the findings are more coherent and more significant for educational practice.

The inconsistencies in the use of the terms "small" and "large" in relation to class size has been responsible for much of the enigmatic character of this field of educational research. Some researchers refer to small classes and mean what others would call small groups of 10 pupils each (Pugh, 1965), while other colleagues distinguish small classes at 40 and large classes at 80 (Anderson et al, 1963). Ross and McKenna (1955) expand upon this problem at considerable length in their monograph on class size. Most commentators and researchers agree that the optimal number of pupils per teacher for most educational purposes in the United States, given our general system, is found between 20 and 30 (Anderson, 1966; Fitzpatrick, 1959). Anderson suggests, however, that class groups of 20 to 30 may, in fact, be among the least desirable and the least efficient of all possible sizes if one considers the educational goals of a given instructional experience.

Criterial Data and Other Concerns

Diversity in the kinds of raw data used from study to study makes the formation of generalizations about an optimal class size particularly difficult to accomplish. Average measures of size and of student achievement are frequently used, but since averages can be distorted by class sizes at either end of a range, some researchers prefer a median statistic (Lindbloom, 1970). As a consequence, comparisons and judgments made upon an aggregate of such mixed designs become attentuated and questionable.

Researchers have recourse to at least four measures of "class size," and comparison of findings is again rendered difficult or impossible. The ratio of pupils to teacher as a gauge of class size has given way to pupil-staff ratios and the concept of numerical staff adequacy (NEA Bulletin, 1971; Ross and McKenna, 1955; Vincent, 1960). The term "staff" may refer to total staff or certificated professional staff only, for an individual school or for the school district as a whole. The amalgam of size criteria found in the literature creates a mosaic from which conclusions and generalizations can be

drawn only at great risk, and the evidence purportedly supporting one position could readily be used to sustain the opposite view (ERDC, 1970).

The identification of a typical class size by school within a district or by grade within a school is frequently difficult. The numbers of students assigned to teachers from grade to grade and to schools within a district can vary considerably by administrative choice (NEA Bulletin, 1971). Population migration and transiency compound the instability of class and school size and the constancy of the research sample. Moreover, the increased numbers of specialized teachers and paraprofessional aides affect teacher work load and infirm the research measures even more.

Justification for a Review

The larger question that comes to mind, given the vicissitudes of the research on class size, asks if a review of this literature serves any real purpose. The existence of this monograph signifies an affirmative answer, of course.

The publication of this research review is undertaken at a time when the issue of class size has become a contentious one. NESDEC is aware that class size has appeared as a negotiable issue between teachers and local school boards, and that the temptations are considerable to select isolated research findings to support a point of view. The number of erroneous generalizations that have appeared in publications representing both teacher and school board associations confirm the myopic tendencies of both sides. Some of the research findings in this review support the value of small classes and would appeal to many teacher advocates. Other studies report more effective instruction in large classes, and these citations could be misused to support a reduction in teaching staff. Neither claim is justified by the sum of the research, which is the very reason why all of the major research is reported, that is, in order that everyone may be fully informed about the ambiguity of the evidence on class size and the misconceptions that gave rise to this extensive literature.

The purpose of this review is to provide the truth on the issue of class size. As the best of tools, truth also becomes the best of weapons in defense of the educational welfare of children and in the protection of the mutual interests of citizens, School Boards, teachers, and administrators.

B. CLASS SIZE AND PUPIL ACHIEVEMENT

The effects of class size have been appraised in various research efforts by criteria of cost, professional opinion, working conditions, pupil achievement, and educational processes (Vincent, 1969). The criterion of pupil achievement will be discussed in this section, with a review of educational processes, working conditions, and teacher load to follow.

Large Size and Pupil Achievement

The general consensus with respect to the effects of class size on pupil achievement at all levels is that the research findings are contradictory and inconclusive (Lindbloom, 1964; Coleman, 1971; Moynihan, 1968; Holland and Galfo, 1964; Nystrand and Bertolaet, 1967; Dyer, 1968, Mitchell, 1969). Contrary to common assumption, some studies have found that differences in class size have either no relationship to pupil achievement or a relationship favoring large-size classes. In an early study of achievement in English, Smith (1930) reported no difference in the achievement of 9th grade students in classes of 20 students or of 50 students with respect to theme writing and other aspects of the English curriculum. Because the larger classes produced superior work in several categories, Smith concluded that variables other than size were significantly more important.

Johnson and Scriven (1967) concluded from an examination of achievement gains made by 7,500 seventh and eighth grade pupils in 265 English classes that class size has no consistent effect on the gains, even between classes of 24 students or less and classes of 34 students or more. "The re-

sults suggest that uncritical worship of small classes for all subjects, grades, and ability levels is unjustified" (p. 309). Warburton (1961) compared groups of 100 or more students with groups of 30 to 35 students in 12th grade English and found the achievement of students in the large groups to be superior in composition, reading, and listening.

Dr. Louis Kishkunas, former Superintendent of Schools in Pittsburgh, reported that two experimental high school English programs would be dropped for want of effective results with a reduced class size. In one program, class size was lowered and teachers were responsible for only four classes daily instead of five. In the other program, lay readers were employed to assist with the correction of English compositions. Students in both programs failed to learn to write significantly better than other students in the school system (MASC, 1972).

Similar findings of no relationship of achievement to class size or favoring the larger group appear in studies of mathematics achievement. Anderson et al (1963) formed two classes of superior students from a total of 225 freshmen scoring at the 8th and 9th stanines of the Differential Aptitude Numerical Test. One class was assigned 40 students and the other 80 students, each with one teacher, for a course in intermediate algebra. At the end of one semester, there was no statistical evidence of a relationship between class size and mathematical achievement. Johnson and Scriven (1967) in the research cited above encountered the same findings for grades seven and eight.

Menniti (1964) compared classes in the Dioceses of Harrisburg and of Evansville, large classes of 40 or more students, small classes of 36 or less students. His findings indicated a significant difference in mathematic achievement favoring large classes in both dioceses and in reading achievement favoring large classes in Harrisburg.

Additional support for large mathematics classes can be found in a study by Madden (1968) of class size and its effect upon the achievement of 9th grade students in general mathematics at mid-range ability. Large classes consisted of 70 to

85 students; small classes contained 25 to 40 students. The Contemporary Mathematics Tests, Junior High School Level, served as pre-test and post-test measures of achievement. The findings led Madden to conclude that (1) student achievement in general mathematics is significantly higher when students are taught in large groups, and (2) achievement for students of average ability is higher in large groups than normal size.

General studies of class size also support the hypothesis of no difference or favor large classes. The review by Blake (1954) is often cited to support the superiority of small classes. When an achievement criterion is used, however, five studies argue for small classes while six studies contradict that position. Ernest Horn (1937) in his book on social studies teaching appeared convinced that class size was not an important factor in achievement. For elementary school instruction, Spitzer (1954) reached the same conclusion.

In phase one of an extended study, Johnson and Lobb (1961) studied the effects of class size upon the achievement of students in English III, Plane Geometry, American History, and Biology in eight senior high schools in Jefferson County, Colorado. Classes of 10, 20, 35, 60, and 70 were organized in these subjects for 1,075 students in the 10th and 11th grades. With only two exceptions, the classes of 60 and 70 had two certified teachers each. From the results of uniform achievement tests administered at the end of the year, the authors concluded that the size of the class did not in itself make any significant difference:

> *Specifically, the experiment produced these findings; first, there were no significant differences in the achievement of pupils in classes of 20, 30, 60, and 70; second, small groups of high capacity learners were not academically or economically feasible; and further, students had not been harmed by participating in large group work (p. 61).*

Fox (1967) reported on the More Effective School Program in New York City. In October, 1966, average class size

in M.E. Schools, grades 1-8, was 20.1, compared with 28.5 in control schools and 27.7 in city-wide elementary schools. No cause-effect relationship could be determined between class size and pupil achievement.

Two European studies report findings contradicting the popular contention about small class size. Marklund (1963) reports upon two samples of 6th grade students in Sweden comprising 4,924 children, grouped in class sizes of 16-20, 21-25, 26-30, and 31-35. Standardized tests in reading, writing, mathematics, English, history, and geography, and mature knowledge were used as criteria. Marklund concluded that a reduction in class size would not lead to improved achievement.

A study of the achievement in geometrical drawing of 103 First Form pupils of a Secondary School in England by Haskell (1964) grouped students into two small classes of 17 pupils and two large classes of 34 pupils each. Students were matched for IQ and age, and the teacher variable, time, and syllabus were controlled. The findings indicate no significant differences in class means between large and small groups, except for a difference in the 3rd term significant at the 5% level. As Haskell notes, "the inconclusiveness of the findings, as related to large and small classes is generally in keeping with the more reliable studies of earlier researchers" (p. 30).

Small Size and Pupil Achievement

Despite the widespread faith in the efficacy of small size classes, research supporting a relationship between small-sized classes and pupil achievement is surprisingly sparse. The review by Black (1954) is commonly cited as verification that small classes are more conducive to learning, but the eleven studies that pertain to pupil achievement produce conflicting findings.

While crudity in research design is not a characteristic exclusive to studies supporting small size classes, it does infirm a recent effort. Frymier (1964) examined the reading achievement of 420 first-grade children in twelve selected schools in Florida. Table 2 of his report indicates that the

students in the large classes were better prepared to learn to read than those in the small classes. Despite this, scores on the Williams Primary Reading Achievement Test indicated statistically superior mean achievement for children in small size classes. Defects in the research weaken the conclusion, however. First, the only controls for the teacher variable were length of formal education and extent of experience. These and other "incidental differences" the author judged "were probably not significant" (p. 91). Second, though the classes were equated for sex, age, physical defects, and attendance, the variability in intelligence was not assessed. And lastly, for purposes of this discussion, large classes were defined as those with more than 36 children, while small classes contained fewer than 30 students. Such "small" classes are now more generally considered to be of regular or even large size for first grade.

A study by Woodson (1968) dealt with a comparison of achievement with the overall class-size policy of 95 school districts. Achievement was computed in terms of residual scores, i.e., the difference between actual score on a standardized test and a predicted score based upon intelligence test scores, for students in grades 4 and 6. Where achievement equaled predictions, the student achieved a mean standard score of 500. Achievement superior to prediction netted a criterion score above 500; underachievement resulted in a criterion score below 500. Woodson determined answers to four relevant questions from his series of correlation computations:

Question 1: Does the class size practice of a school district reflect itself in the academic achievement of its pupils?

Answer 1: Slightly. "There is a small inverse relationship between the size of classes in a district and the academic achievement of its pupils as predicted by a measure of academic potential" (p. 2). However, the pattern of the data from variable to variable and sample to sample was not universally consistent in support of the conclusion that there is small inverse relationship between scholastic achievement of pupils and class size.

Question 2: Are the relationships between class size and scholastic achievement the same for pupils of different academic potential?

Answer 2: No. The only significant correlations at the .05 or less level of probability (7 of the 192 correlations computed in Tables 1 and 2) showed an inverse relationship between class size and academic achievement for low ability pupils only. *(Low ability pupils were defined as those with Otis IQ's below 85.)* To this he adds the caution, "Nor was the weight of the evidence sufficiently clear to conclude that the scholastic achievement of the lower ability pupil was influenced to a greater extent by the size of the class in which he studied than was the achievement of the student of higher academic potential" (p. 3).

Question 3: Are the relationships between class size and scholastic achievement the same for reading and arithmetic?

Answer 3: Unknown. None of the relationships between class size and performance of all students were significant. The correlation signs only suggest an *inverse* relationship between class size and reading achievement, and a direct or *positive* relationship between class size and arithmetic achievement.

Question 4: Do the magnitudes of the relationships between class size and achievement differ for school districts with larger or lower percentages of small classes?

Answer 4: Yes. Woodson found that mean criterion scores were higher for the group of districts in the lower third of the class size range. But, the only significant differences between means were for 4th grade students (Table 3). Second, the mean class size of districts whose students scored in the lower third of the criterion range was about 25, while the mean class size in districts whose students scored in the upper third of the criterion range was about 24. However, only 2 differences were significant at the .05 level. Third, districts whose stu-

dents scored in the upper third of the criterion range had a greater percentage of classes with less than 22 children (Table 4). But, only 4 of 24 differences were significant at the .05 level, and 3 of those concerned low ability students below IQ 85.

Several problems attend upon this extensive study. First, the findings are apparently not generalizable because the sample of school districts was not randomly selected. Second, the absence of any control on the teacher variable raises questions about the findings and about the participating districts. Third, districts with a significant number of elementary level classes under 22 may differ markedly in other important characteristics from districts whose class sizes average 27 or more. For example, if the former districts are indeed more affluent, they may pay teachers more and may demand teachers with superior education and experience. In that case, the teacher variable assumes major importance. The most insightful of Woodson's conclusions may be that "the findings from this study documented the fact that the relationship between pupil achievement and class size is not a simple one" (p. 6).

In one of the latest studies of the question of class size (Moody, 1972), the findings have the virtue of being definitive at least. A sample of 83 fourth grade students was grouped into classes of varying sizes for instruction toward 10 mathematical objectives. The students were grouped into 20 groups: ten groups of 2, four groups of 5, and one group of 23 in each of three schools. The study was confined to a single lesson. It may come as less than a surprise that the students in each of the smaller class sizes achieved significantly more than did the children in the class of 23 students. One-to-one instruction was superior to one-to-five. What Moody seems to have discovered is that class size at the extremes of the conceivable range can have a bearing upon instructional outcomes. The finding that one-to-one instruction can be superior to other teacher-pupil ratios has been widely accepted for some time, but this superiority is probably restricted to those learning outcomes that do not require any degree of pupil-pupil interaction.

Among the more powerful studies from the literature on class size are the two existing longitudinal investigations, both of which sustain the argument for small class size. Balow (1969) conducted a longitudinal study of reading achievement for the same sample of children extending through grade 1 to grade 4. In an analysis of terminal 4th grade reading achievement scores for these students, the students in the smaller classes of 15 students for two or more years scored significantly higher than the children in the larger classes of 30 for the same period of time. Balow concluded that a positive relationship between small class size and pupil achievement came about when a given group of students was continued without any change in their placement in small classes over a period of two or more consecutive years. He judged the 1st grade to be the critical year in reading instruction but that achievement patterns had become sufficiently confirmed in each child by grade 3 to negate the advantages of small class size by itself.

Perhaps the most impressive study of the relationship of class size to pupil achievement was that conducted by Furno and Collins (1964) over a five-year period from 1959 through 1964 in the Baltimore Public Schools. Their purpose was to determine what relationship, if any, existed between class size and pupil achievement in the areas of reading and arithmetic, together with the relationships of class size to certain home factors and faculty factors. The sample comprised 16,449 students who were in grade 3 in 1959 and were subsequently followed over a five-year period until the students were distributed in 1965 between grade 5 and grade 10 (p. 12). In grade 3 in 1959 the students were grouped into classes of four different sizes: 25 or less, 26-31, 32-37, and 38 or more. Over the years the criterion tests used were the Metropolitan Elementary Reading and Arithmetic Tests, Stanford Elementary Reading and Arithmetic Tests, and Stanford Intermediate Reading and Arithmetic Tests. By and large, the findings of this longitudinal study reportedly favored small sized classes for maximum gains in pupil achievement (Tables 1 and 2).

Furno and Collins concluded that students in smaller classes made significantly greater gains in pupil achievement

in both reading and arithmetic over the five-year period. Of the 243 comparisons drawn, 188 favored students in smaller classes against only 55 for students in larger classes, a ratio of 3.4 : 1 in favor of smaller over larger classes. In their comparison of the achievement gains made by students in the smallest class size, 1 to 25 students, with those made by students in classes larger than 25 students, the authors found that 61% of the comparisons favored the smallest class size against only 8% favoring the larger class sizes. They judged the advantages of the smallest class size to be considerably more productive for non-white students than for white students. Non-white students in smaller classes made greater gains in 66% of the comparisons as against greater gains favoring larger sized classes in only 3% of the comparisons.

Certain significant points remain to be considered in connection with this study. While the evidence appears to support the conclusion that smaller classes result in greater achievement than do larger classes, this point may be of minimal concern outside an urban setting. For many communities the question centers around the magic number 25 when the pattern of organization in the school system is one of traditional self-contained groupings at the elementary school level and departmentalized class groups at the secondary school level.

If the question then is whether classes of 25 give greater promise of achievement than do classes of 30, the data in the Furno and Collins study is less clear cut. For example, Table 1 shows the number of favorable comparisons between class groups of 1-25 and 26-31 for white children in regular curriculum classes. In the case of the Reading Achievement comparisons, four comparisons favor the smaller sized group and four comparisons favor the larger sized group, while eight comparisons show no significant difference. An examination of Table 1 for the comparisons between class groups of 1-25 and groups of 26-31 show that three of the four reading comparisons favoring the smaller-sized group derive from the children with iQ scores *79 and below*. In the case of the Arith-

metic Achievement comparisons for all students, Table 1 shows six comparisons favoring the smaller sized group and four comparisons favoring the larger sized group, with six comparisons showing no significant difference. Of the six comparisons favoring the smaller sized group, four of them derive from the achievement of children whose IQ scores were *79 and below* (Table 1). Thus, of the ten comparisons in reading and arithmetic combined favoring the smaller sized group, 1 to 25 students, seven of them derive from the lowest intelligence group (IQ 79 and below) and two from the next to lowest intelligence group (IQ 80-94). As in the case of the Woodson study, the intelligence and ability of the student may be a critical variable in the determination of desirable class size, with respect to white children at least.

For white children whose IQ's are 95 and above (Table 1, rows 4 and 5), the data in the Furno and Collins study with respect to the two class groups, 1-25 and 26-31, appear to favor the larger group. With respect to Reading Achievement, Table 1 shows no comparisons favoring the smaller group, one comparison favoring the larger group, and three comparisons showing no significant difference for white children with IQ scores 95-104. For white children with IQ scores of 105 and above (Table 1), reading comparisons for these two class sizes show no comparisons favoring the smaller group, one comparison favoring the larger group, and three comparisons showing no significant difference. In summary then, pooling the findings in Table 1 for white students of IQ 95 and above, no reading comparisons favored the smaller group, two favored the larger group, and six showed no significant difference. In arithmetic for the same pooled group of white students of IQ 95 and above, the findings are similar: one comparison favored the smaller group, three comparisons favored the larger group and four comparisons showed no significant difference. The total of the achievement comparisons for white children with IQ 95 and above shows one comparison favoring the smaller group, five comparisons favoring the larger group, and ten comparisons showing no significant difference. It seems reasonable to suspect, therefore, that differences in achievement between class

TABLE 1

Statistical Significance of the Differences Between Means for Small (1-25 students) and Large (26-31) Class Groups of Students at Selected IQ Levels in Reading and Arithmetic Achievement, White Children Only.[1]

IQ RANGE	READING ACHIEVEMENT NO. COMPARISONS FAVORING			ARITHMETIC ACHIEVEMENT NO. COMPARISONS FAVORING		
	Small	Large	Not Signif.	Small	Large	Not Signif.
All Students	4	4	8	6	4	6
IQ 79-Below	3	1	0	4	0	0
IQ 80-94	1	1	2	1	1	2
IQ 95-104	0	1	3	1	1	2
IQ 105-Above	0	1	3	0	2	2

1. Adapted from Furno, Orlando F., and Collins, George J., *Class Size and Pupil Learning*. Baltimore: Baltimore Public Schools, 1967, Tables 73; 37-40 (ERDS No. ED 025003).

groups of 25 and class groups of 31 are attributable more to differences in intelligence than to differences in class size.

At the conclusion of their study, Furno and Collins propose that class size is still an important policy consideration in the pursuit of education excellence. They write:

> *After more than a half century of research on class size, school administrators, school officials, classroom teachers, exclusive bargaining representatives, professional educational organizations, and lay persons still attach great importance to class size. That this importance is probably justified with respect to pupil achievement in reading and arithmetic is borne out by the findings of this study* (p. 141).

Concern for class size may well be justified, particularly in the City of Baltimore if the reported distribution of class sizes with only 8% in the range of 1-25 is representative of the city as a whole. If, as the report suggests, over 75% of the classes in Baltimore comprise 32 or more students, class size warrants attention. Classes of 32 or more students may be significantly detrimental to achievement, especially in the case of non-white students (Table 2), though this conclusion is not so clearcut in the case of white children. Other variables may be equally important and more deserving of intense study to ascertain why, in reading and arithmetic, the pupils in this study on the average tended to fall further behind the national norms over the five-year period.

Commentary

An examination of the research evidence with regard to class size and pupil achievement offers no support for the contention that smaller size classes will lead to greater gains in pupil achievement. The evidence is overwhelming that class size within commonly experienced limits has little or no decisive impact upon the learning achievement of students, and that larger class sizes may produce environmental dynamics conducive to greater achievement with particular subject matters and particular students.

TABLE 2

Statistical Significance of the Differences Between Means for Small (1-25 students) and Large (26-31) Class Groups of Students at Selected IQ Levels in Reading and Arithmetic Achievement, Non-White Children Only.[1]

IQ RANGE	READING ACHIEVEMENT NO. COMPARISONS FAVORING			ARITHMETIC ACHIEVEMENT NO. COMPARISONS FAVORING		
	Small	Large	Not Signif.	Small	Large	Not Signif.
All Students	3	0	13	6	2	8
IQ 79-Below	2	0	2	2	0	2
IQ 80-94	1	0	3	3	0	1
IQ 95-104	0	0	4	0	1	3
IQ 105-Above	0	0	4	1	1	2

1. Adapted from Furno, Orlando F., and Collins, George J., *Class Size and Pupil Learning*. Baltimore: Baltimore Public Schools, 1967, Table 74; 61-64 (ERDS No. ED 025003).

This is not to say that class size is of no importance. Obviously when pushed to ridiculous extremes, class size can have some bearing upon instruction and achievement. As cited earlier, a lecture delivered without voice amplification to a group of 1000 people where 500 cannot hear the speaker is a futile undertaking because of the inordinate size of the "class." Or, in a case where an instructor projects an image on a screen for a class of 30 students where the image is too small to be perceived clearly at a distance greater than five feet, it could be said that the size of the class was the defeating variable for purposes of learning. All that such illustrations suggest, however, is that class size is a poor variable to isolate from the interrelationship of the multiple variables that seem to make for successful instruction. That class size *could* be one of these variables is possible. That class size *is* one of these variables leading to improved pupil achievement is not borne out by research to date. In other words, if improvement of instruction and greater gain in pupil achievement are the goals in question, class size is not the determining factor.

In addition to the evidence supplied in this review negating class size as an important factor in pupil achievement, further support for this position emanated from the nationwide study on equality of educational opportunity, now commonly known as the Coleman Report (Coleman, 1966). With respect to this report, Rossi (1971a) writes:

> *Another example of the power of wishful thinking has to do with the relationship between class size and learning. It is an article of faith among educators that the smaller the class per teacher, the greater the learning experience. Research on this question goes back to the very beginnings of empirical research in educational social science in the early 1920's. There has scarcely been a year since without several dissertations and theses on this topic, as well as larger researches by mature scholars—over 200 of them. The latest was done by James Coleman in his nationwide study for the Office of Education under the Civil Rights Act of*

> *1964. Results? By and large, class size has no effect on learning by students, with the possible exception of the language arts (Author's italics) (p. 278).*

Indeed, Coleman in his discussion of school facilities and curriculum and their relationship to pupil achievement dismissed the matter of pupil/teacher ratio entirely:

> *Some facilities measures, such as pupil/teacher ratio in instruction, are not included because they showed a consistent lack of relation to achievement among all groups under all conditions (p. 312).*

Commenting on the same report, Christopher Jencks (1972) draws the following conclusions:

> *There is no evidence that cutting class size would narrow the gap between disadvantaged and advantaged pupils. On the contrary, the shaky evidence of the EEOS (Equality of Educational Opportunity Study) suggests that a general reduction in class size might even widen the gap. I conclude that while reductions in class size can often be justified in terms of teachers' sanity, pleasant classroom atmosphere, and other advantages, they are hard to justify in terms of test scores (p. 98).*

Even from the evidence available before the Coleman Report, Holland & Galfo (1964) in their review of the research concerning class size found little to support pupil/teacher ratio as a major factor in the quest for greater achievement:

> *No matter how the research is divided for analytical purposes–by grade level, subject, experimental design, or historically–the results are not consistent. Some projects found in favor of large classes; some found for small. One must conclude that either the designs were uniformly invalid or else there were factors operating to produce the learning results which worked over and above the teacher/pupil ratio (p. 19).*

However, they felt that research to that date had served to point up certain important considerations:

> *Perhaps the most significant implication of modern research into class size is the emphasis it puts on the well-trained, highly motivated, experienced teacher who is given high professional status in the classroom and subordinate personnel to assist in the accomplishment of the learning objectives. Learning by pupils in large groups can be effective provided:*
>
> *1) The teacher is trained and motivated for his task.*
>
> *2) There is opportunity for small group work to accomplish some objectives of teaching that are not fulfilled in large classes.*
>
> *3) School facilities and schedules are kept flexible (p. 20).*

In a more recent survey of the research, Lindbloom (1970) asked what implications the research had for class size policy, and concluded:

> *Most studies on class size reveal inconclusive findings in relation to achievement with the exception of two recent, carefully constructed longitudinal studies (Balow and Furno-Collins) (p. 36).*

With respect to this regard for the Furno and Collins study reviewed earlier, two objections must be registered. First, the analysis of the Furno and Collins paper earlier in this study illustrated that in the case of the class sizes most common to suburban areas, i.e., 25 students or less versus 26-31 students, the comparative data supplied by them negates the advantage of the smaller class size with respect to achievement in reading and arithmetic. Second, some objection can be raised about the handling of the comparative data in their study and the correlative data in the Woodson study, in connection with the dismissal of those data indicating insignificant differences.

The distinction appears to hinge upon the hypothesis chosen for testing. The number of comparisons or correlation coefficients indicating no significant difference between the achievement of small and larger groups may be disregarded if the research hypothesis reads: "Achievement gains of students in small classes of 25 or less will be significantly greater than achievement gains made by students in classes of 26 or more." Then, the critical comparisons are between students in small groups who make gains and students in large groups who make gains. However, the common contention seems to be that students in smaller classes will consistently make greater gains in achievement than will students in classes larger than 25, or 22, or 20, because of the differential in class size. For purposes of research, the hypothesis could be stated in this form: "There is an inverse relationship between class size and pupil achievement such that as class size diminishes, pupil achievement will increase." In this case it seems improper and illogical to dismiss those findings indicating no significant difference in achievement, as in the case of the Furno and Collins study and the Woodson study. Data instances confirming the hypothesis would be those where smaller class size was associated with commensurate gains in pupil achievement. Data instances infirming the hypothesis would be those where smaller class size showed no increase in pupil achievement and where larger class size did show increases in pupil achievement. It can be argued that the burden of proof falls upon those who contend that smaller class size produces commensurate increments in learning achievement. Those cases where the opposite occurs or where there is no significant difference in smaller or larger class settings properly combine to argue against the hypothetical contention. If the data reports from the Furno and Collins study and in the Woodson study are assessed in this vein, the least conclusion to be drawn is that smaller class size makes no difference with regard to pupil achievement.

Commenting upon the vicissitudes of educational research, Rossi (1971b) refers a second time to this question of class size:

> *Further replication may be called for to establish more firmly a set of negative findings. (Apparently, positive findings are more easily accepted than negative ones.) The best example here is the long history of research on the effects of class size on learning, in which each new generation of educational psychologists attempts anew to find a strong negative association between class size and learning, but with only equivocal success: the results of more than 30 years of research on this topic can be summarized as showing that sometimes class size has a small positive effect and sometimes a small negative effect and can be interpreted as showing the usual sampling variation around a universe value of no effect at all (pp. 98-99).*

It appears that Rossi, for one, is thoroughly convinced.

Recently the Massachusetts Association of School Committees submitted a questionnaire to each of its member districts inquiring about issues in collective bargaining most likely to be raised by the teachers in the district in the next bargaining sessions. The issue of class size or teacher load held third place in the list of 30 items with 80 positive replies out of the 155 returned. Teachers concern about this issue is probably not lessened by the viewpoint expressed by the Massachusetts Teachers Association, presumably reflected in an editorial by Dr. William Hebert, MTA Executive Secretary-Treasurer, when he wrote:

> *Extensive research is available which indicates that students in smaller classes make significantly greater gains than children in crowded classrooms, yet arguments to the contrary are very fashionable today (1972, p. 2).*

Admittedly the words "crowded classrooms" cloud the meaning of the statement somewhat, but the implication that children in smaller classrooms make greater achievement gains seems quite clear. The truth is that the research establishes just the opposite, and the conclusions drawn by Peter Coleman (1971) in his review of the research may be much to the point:

One main conclusion is that research findings are relatively clear and consistent on the fact that the benefits to students of minor changes in the pupil/teacher ratio are non-existent, or at best so small as to be non-measurable. It has already been pointed out that there are significant benefits to teachers, however. The issue remains a controversial one then, but one in which the appropriate policies of school boards and departments of education are fairly clear in a time of fiscal belt-tightening. Naturally, teachers will and should oppose such policies, in their own interests. But it is clear, from the evidence cited above, that this opposition cannot rationally be based on the quality of education, or the consequences for student achievement implicit in student/teacher ratios (p. 10).

Since the research evidence supports neither small nor large class sizes as consistently beneficial to pupil achievement, it follows that the search for a single optimum class size has been equally futile. Goodlad (1960) in his review of the research of classroom organization commented as follows on the question of class size:

Class size. One other question of classroom organization demands brief attention: Is there an optimum class size? Most of the studies before 1925 and a few since that time sought to relate class size to measurable student achievement. There is nothing in the evidence to suggest that large classes materially affected attainment in subject matter under teaching techniques considered typical at that time. Subsequent studies of the relation of class size to student attention, discipline, self-reliance, attitudes, and work habits failed to establish a research basis for decisions on class size (p. 224).

In his conclusions on class size, Lindbloom (1970) notes that "as yet, no set optimum size of class nor best pupil/teacher ratio has been determined. The optimum class size is

no doubt dependent upon a host of considerations, not the least of which is the nature of the learning objective source" (p. 36).

Varner (1968) in his research summary on class size for the National Education Association comments as follows on the question of optimum class size:

> *Research findings do not indicate that there is a one best class size, nor one best teacher/pupil ratio. However, it seems clear that in a small class a good teacher can devote more attention to individual pupils and their particular educational and emotional needs than the same teacher can devote in a substantially larger class. It appears that the teacher, his instructional methods, and his personal outlook are important factors that make a difference as class size varies. If the teacher approaches a small class just as he does a large class, the measurable differences between the two groups may be negligible (p. 5).*

This emphasis upon the interrelationship of variations in class size and other important factors is the major point stressed by Holland and Galfo (1964) when they concluded:

> *After culling the many projects purporting to shed light on the class size question, we have concluded that our first hypothesis cannot be rejected. There is not an optimum class size. Moreover we are also compelled to accept the second hypothesis that the so-called "proper" class size is a function of many factors: course objectives, nature of the subject matter, nature of the teaching process used, teacher understanding and morale—to mention a few of the variables which have been studied and found relevant (p. 19).*

A large part of the problem in the resolution of the question of class size lies within the research itself. One of the major shortcomings in most of the research to date has been the failure to control for important variables, other than class size in the teaching situation, that have a bearing upon

pupil achievement. Perhaps the major defect has been the frequent failure to control for the teacher variable itself. As Vincent (1969) writes in his review on class size for the Encyclopedia of Educational Research:

> *Almost without exception the studies done appeared to adopt the mythical view that all teachers are equivalent. This is not to say that certain studies do not attempt to "control" the teacher variable by age, sex, years of training, experience, and the like. However, the problem is somewhat more complex and relates to the balance between the quantity and the quality of staff (p. 141).*

Many of the studies reporting the positive relationship between large class size and gains in pupil achievement seem not to have controlled for the teacher variable, but the same accusation applies to most of the studies favoring small class size as well. In the study by Haskell (1964) an attempt was made to control for class size when Haskell served as the teacher of both the large and the small groups, but the risk of the teacher bias effect is greatly magnified by this solution to the control problem. In the case of studies supporting smaller class size, the study by Furno and Collins includes the teacher variable as one of the comparative measures, but there is no indication in the published report of the study that the teacher variable was controlled in any way in the comparative assessments of gain in small and large classes. Even when an attempt is made to control the teacher variable, this is generally done on the basis of teacher experience and education.

Curiously, research does not support the presumption that teacher experience is positively related to pupil achievement. Bobbie (1968) in a study on the identification of effective teachers found that years of teaching experience were insignificantly related to pupil achievement. Jencks (1972), reporting upon the findings in the Coleman report, writes with respect to teacher experience:

> *The relationship between teacher experience and student achievement has already been discussed. It was small but statistically significant. It seemed to*

reflect the selective recruitment of teachers to over-achieving schools rather than the superior effectiveness of experienced teachers. Unlike most of the other relationships discussed in this chapter, it held up when schools in the same district were compared as well as when districts were compared. It did not hold up for reading or math (p. 102).

With respect to teacher knowledge and competence, Jencks (1972) writes:

A second device for improving the quality of teachers is to administer exams which supposedly identify incompetence. The National Teacher Examination is often used for this purpose. . . . . Districts which use such exams to select teachers have pupil verbal scores from two weeks to two months lower than similar districts which do not use the exam. There is a smaller difference in the opposite direction on the reading test, and no difference on the math test.

Logically, the impact of the teacher upon pupil achievement is most likely to result from the decisions and behaviors made by the teacher, rather than upon such static variables as experience and knowledge. In the absence of definitive measures of teacher performance, the teacher variable will continue to be a difficult one to control.

The real breakdown in class size research is due more to faulty research design than to any other factor. Most studies have attempted to deal with class size as an isolated variable, when the consensus of opinion is that it is only one of many intricately related variables. In writing about the lack of definitive studies on this question of class size, Shane (1961) wrote:

One is lead to infer that the many different kinds of elementary and secondary classes, the varied characteristics of local communities, intellectual and temperamental differences among teachers, and the diverse nature of the subject matter between grade levels as well as within a grade level

have made research on class size a problem that could be attacked only in a limited, qualified, or piecemeal fashion.

Varner (1968) sums up the problem as well as most students of the question when he writes:

> *Can conclusions be drawn from existing class size research? Opinions have differed on this important question. The present survey suggests that it may not be so much that research is not conclusive, as many have thought, as it is that research has not been comprehensive. Many variables are present in the classroom environment – the pupils, the teacher, the subject matter, and the teaching methods, to name a few. Although the study of classroom environment is a multivariate problem, most class size research conducted to date has tended to use a single variable approach. . . . . .*
>
> *In general, both opinion and research tend to agree that in order to produce optimal results – for both pupils and teachers – the size of class must be appropriate to the intellectual-emotional needs of the pupils, the skills of the teacher, the type of learning desired, and the nature of the subject matter (p. 5).*

In the absence of valid research, it behooves teachers and school officials to react with care on this matter of class size. Teachers who may feel inclined to attribute mediocre pupil achievement to a large class size when that size numbers 30 or less might be well advised to put less faith in that explanation of low achievement and turn their efforts to other variables in the process of instruction. School officials would do well to avoid all legal restrictions with respect to class size since 1) grouping flexibility so necessary to perfective instruction could be seriously impeded by numerical limits on class size, and 2) expensive and meaningless adjustment in school staffing could become mandatory or contentious.

C. CLASS SIZE AND TEACHING PROCESSES

A substantial literature has developed from research on the relationship of class size to teaching processes and practices presumed to be indicative of a productive learning environment. The criterion in these studies is not actual pupil achievement. Rather, the frequency with which activities presumably conducive to learning appear in classes of varying sizes is the criterion favoring one size or another. Without exception these studies favor smaller class sizes, but in no case has the effectiveness of the presumably beneficial learning activities been validated by an evaluation of pupil achievement.

Research in this direction appeared in a study by Baker (1936) and another by Lundberg (1947) suggesting that classes of smaller size fostered better study attendance, student behavior, and teacher morale. Newell (1943) concluded that teachers in small classes were more likely to design new instructional approaches and to adopt innovative practices suggested in the educational literature. The support offered for smaller sized classes in the review of the literature by Blake (1954) rests largely on factors other than pupil achievement. Commonly, 16 of Blake's 22 acceptable studies are said to favor small class size, but of those 16 studies, eight rest on nothing more than teacher and administrator opinion. Only three of them found smaller class size more conducive to greater teacher knowledge of students and more promising class activities and practices.

The bulk of the research upon class size and its relationship to teaching processes has emerged from studies conducted at Teachers College, Columbia University, and from the Institute of Administrative Research located there. Richmond (1955), using a check list of 62 selected teaching practices, made a study of larger and smaller classes in middle elementary school grades. He concluded that in school systems where class size had been reduced, an increasing frequency of practices designed to produce greater teacher understanding of individual children, of their needs and aptitudes, could be found. A notable type of "Hawthorne effect" appeared when teachers were urged to take advantage of

smaller class sizes. Allegedly beneficial results came more quickly when teachers were informed of a forthcoming policy decision to reduce class sizes than when they were not. Concomitantly, when teachers were informed of the need to increase class size, were urged to consider ways to reduce the presumed negative effect, and were offered additional help in this regard, the loss in good practices was not as great as when nothing had been done except to assign more students to each teacher.

Whitsitt (1955) made a study of high school social studies and English classes in 35 school systems with large classes (34 students and over) and small classes (less than 24 students). Using an observation technique, he concluded that in all of the small classes there was more group work, more informality, and more opportunity for interaction of all kinds. Enrichment materials beyond the textbook were used more extensively in most of the small classes while most of the large classes adhered strictly to the textbook.

In his doctoral thesis at Teachers College, McKenna (1955) compared class sizes in elementary and high schools by an instrument he called the "Growing Edge," a check list of supposedly desirable educational practices published and used by the Metropolitan School Study Council. He concluded that teachers in small classes knew more about their students, were able to keep better records of their progress, and were able to attend to their talents and weaknesses more regularly than could teachers in larger classes.

Ross and McKenna (1955) reviewed the research to that date on this question of class size. Reviewing McKenna's earlier work in some detail, they stressed his finding that the correlation between Growing Edge scores and the total number of professional staff members per 1000 students was somewhat higher than the correlation between this Growing Edge quality measure and average class size. The quantitative measure of staff which assisted most in predicting school quality scores by the Growing Edge measure was the total number of professional staff members per 1000 students, but this correlation was strongest when combined with adequate

salaries and an adequate school budget. Using their criteria of presumably desirable classroom conditions, Ross and McKenna drew several conclusions, among which were the following as they saw them:

1. Desirable classroom conditions are more likely in smaller classes, "with some words of caution" (p. 22).
2. "It is patently indefensible to argue for any arbitrary, common size. Local conditions, purposes, quality desired in education, and the abilities of the teachers must be weighed. The question, 'Class size for what end and under what circumstances?' must always be asked" (p. 22).
3. "Class size that deviates too markedly from that which might be expected of a system in the light of its financial provisions tends to have negative results" (p. 22).

At the Institute of Administrative Research the investigations proceeded unabated into the relationship of class size to classroom activities presumably conducive to learning. Pugh (1965) identified 16 learning activities that in his judgment represented the major classes of individualized learning. A total of 180 observations were made in nine school districts by ten "highly qualified men and women." The observers recorded instances of desirable learning activities in small classes of 20 students or less and in larger classes of 30 students or more, ranging from kindergarten through grade 12. In addition to the absence of teacher control in this study, the controls for observer validity and reliability are not well structured. He concluded, among other things, that a far greater percentage of individual and small group activities are found in small classes than in large classes; that many teachers in both large and small classes depend primarily on four learning activities to develop pupils' concepts—listening, reading, recalling, and observing; that whole class instruction occurs with greater frequency in grades 7-12 than in the elementary grades; and that there was a statistically significant difference in favor of small classes in only 7 of the 16 learning activities investigated.

In recent years the most widely publicized series of studies on class size have been those emanating from IAR, based upon an instrument called "Indicators of Quality" introduced by Vincent (1967). Indicators of Quality is an observation instrument composed of 51 polarized signs which are designed to measure the presence or absence of each of four criteria: 1) individualization, 2) group activity, 3) interpersonal regard, and 4) creativity. Observers record the presence or absence of designated sign-characteristics of these four criteria during a 20-minute time period in a classroom. The score is obtained by subtracting the number of absent-indicator signs (negative) from the number of present-indicator signs (positive), resulting in a net-difference score.

Vincent (1968) characterized this instrument as a "process measure," in contrast to achievement test results classed as output criteria. Referring to a then unpublished study conducted in 1967 where the Indicators of Quality instrument was employed in 47 school districts in elementary and secondary school grades, Vincent claimed that "the general parameters qualifying the class size question have begun to come clear. We now have a basis for distinguishing between large and small in class size" (p. 7). The tabulation of the mean difference scores for the elementary grades indicated for him two sharp declines in quality of teaching processes: when class size exceeded 15 and when class size exceeded 25. At the secondary level, he perceived a sharp break in quality when class size exceeded 15.

Using the same data, Coble (1968) gave a more discreet analysis of the subscores in the various classes taught. His analysis of the Indicators of Quality scores by subject matter at the elementary and secondary level are most enlightening. The scores show a remarkable range at both levels, most especially at the secondary level. Keeping in mind the four categories represented by this scale, it is not surprising that on variables of creativity and the like, art classes should show the highest of the secondary school scores or that commercial classes and science classes with their laboratory sessions should show low scores. Coble senses a variable confounding this instrument and its implications when he notes: "It is

quite possible that some courses of study, such as those in the commercial area, are relatively inaccessible to this instrument. For example, an observer may see a typing class where everyone is busily working at a machine at his own rate of speed in a manner that is highly individualized, yet few of the signs in the instrument would apply" (p. 3). This observation alone strongly suggests that the Indicators of Quality instrument, whatever its merits, cannot be directly related to class size without the simultaneous consideration of the nature of the subject being taught and the grade level in question. For example, when Coble examines the scores by the style of activity in the classroom, small group work naturally ranks high on this scale whereas the projection of a movie ranks exceedingly low. By this criterion of quality, small group work should occur as frequently as possible, and movies rarely or not at all, though the particular purposes served by each of these activities is clearly not interchangeable.

The work with the Indicators of Quality instrument was continued by Olson (1970) in an analysis of 18,528 classroom observations conducted in a total of 112 school districts ranging nationwide from the City of Boston to the State of Washington. Through a modified step-wise regression process, Olson arrived at a series of conclusions with respect to the criteria of quality and familiarity as classroom variables. With respect to class size, Olson stated:

> *The relationship between class size and the criterion scores was well defined and consistent throughout each level of analysis, providing ample support for this hypothesis (class size is related to the criterion scores). Any way one tries to slice it, smaller classes produce significantly higher scores than large ones. This was true for both elementary and secondary levels. . . . . .*
> *Viewed as a whole, class size took a back seat to "subject taught" and "style of activity" as predictors of the criterion scores. Said another way, for certain styles of activity and for certain subjects taught, varying numbers of students in the classroom produced little variation in criterion scores.*

> *What seems clear is that emphasis should be placed on adapting class sizes to fit the unique needs of particular subjects and the realistic purposes of the various types of educational activities (p. 8).*

It would seem from this comment that Olson has abandoned the search for that optimum class size that Vincent (1968) felt was almost within the grasp of educational researchers.

In a subsequent analysis, Olson (1971) subjected the data to procedures similar to those used by Coble (1968). Olson perceived the same low scores for certain teaching styles and writes in this regard:

> *It seems advisable to clarify here that a low score for a certain teaching style does not rule it out as an effective technique nor does it suggest that a teacher should remove same from his repertoire of classroom behaviors. What these scores do say, and this was borne out by other analyses, is that judgmental decisions must be made as to how frequently these styles should be utilized as well as for what purposes. In the long run, as a statistician might say, the higher scoring styles should predominate (p. 4).*

The implication that style or methods of instruction should take precedence over the purposes of that instruction seems somewhat at variance with the author's later statement in his summary. Addressing himself to the question of class size, Olson finds so-called "break points" in the quality scores for elementary and secondary schools as had Coble in the earlier work. Olson advises schools to consider lowering class size ratios to a number close to or on the low side of a critical break point, but he cautions that lowering a ratio by one or two students is entirely unjustified in view of the data. He also notes that in 56% of the cases at the elementary level and 74% at the secondary level the participating school districts had class sizes with fewer than 26 students. He observes that this is extremely close to the 25:1 pupil/teacher ratio recommended by the National Education Association and other professional groups (p. 5). In his summary he seems to depart

radically from the notion of optimum class size that had motivated so much of the work in the past at the Institute of Administrative Research. Olson writes:

> *An analysis of table data for 1,103 variable groups led the investigator to conclude that participating school systems administrators/teachers should place major emphasis on varying class sizes to fit the unique needs of particular subjects with a careful view towards realistic, well defined purposes for the various styles of educational activity. Undoubtedly, the proper combination of circumstances would produce great numbers of classroom performance scores surpassing even the highest found in the study (p. 11).*

Commentary

The research on the relationship of class size and teaching processes is problematic because of the difficulties inherent in the identification of instructional practices and pupil activities conducive to learning progress for all children at all levels in all subjects. Nonetheless, the Institute for Administrative Research has generated various sets of criteria presumably indicative of quality education and of promising classroom practices, and with such criteria various researchers have attempted to verify an optimal class size. There has been little refutation of this research over the years, probably because of the essentially subjective nature of the criterial attributes employed and the absence of satisfactory operational definitions for these criteria. For example, the four criteria proposed by Vincent (1967) as Indicators of Quality manifest a distinctly inherent bias in favor of smaller size groups, where individualization, group activity, and interpersonal regard are more likely to appear by the very nature of the social organization alone.

The absence of operational definitions further infirms such quality measures. The 16 learning activities produced by Pugh (1965) to indicate the quality of learning in the class-

room seem to require an extraordinary degree of inference on the part of the observer in the classroom. The cognitive processes included in the list are profound and poorly defined in the best of the educational literature. Pugh's guidelines to observers appear exceedingly simplistic compared to the complex behavioral hierarchy constructed by other researchers, e.g., the Bloom et al (1956) taxonomy of behavioral objectives for the cognitive domain.

If the concept of "recommended practices" supported by supposed authorities in education can be accepted, there is some evidence that class size is not a determining factor in the occurrence of such practices. Otto (1954) conducted a two-part study of classroom behaviors in relation to class size. In his tabulations of the percentages of small and large classes manifesting 39 specific activities from six categories of operating principles widely held in elementary education, only four activities showed significant differences between small and large classes, and three of those favored large classes (pp. 131-133).

In the second part of the study, 255 teaching techniques, including 45 not-approved techniques, were grouped under 26 operating principles, and observations were recorded in the 50 small and 50 large classes. The findings tended to support the larger classes:

> *In only six of the 255 techniques listed as being used in teaching arithmetic, art, health, language, physical education, reading, science, social studies, spelling, and writing were differences in usage between the two groups of classes large enough to be statistically significant at the 5 percent level. . . . . Techniques numbered one through four were observed more often in small classes than in large classes. The first three of these practices, however, are not recommended by specialists in the field of elementary education. Techniques numbered five and six were observed in use in more large than small classes. Both of these are approved practices (p. 138).*

This research on the characteristics of classroom activity, traits of teachers, and the like, without validation from objective tests of student achievement or teacher effectiveness, has provoked widespread discontent with such subjective foci. The press for educational accountability is little satisfied with rationalized optimism. Rossi (1971) accuses the research group at Teachers College, presumably the Institute of Administrative Research, of biased research that dismissed achievement testing as the criterion of the goodness of the school system when those tests no longer supported the innovative practices that the group had sponsored (p. 99). Biased or not, a research approach that focuses upon modes of instruction or methods of teaching is essentially a means-oriented perspective on instruction, rather than a goals-oriented approach. There is simply no justification for establishing particular teaching methods or means as the best indicators of instructional quality. The research upon teaching methods has yet to designate one method or any group of methods that are superior to any other methods in all situations for all levels of students (Wallen and Travers, 1963).

The consequences of a means-oriented perspective are reflected in the conclusions drawn by Vincent (1969) in his review of the research on class size:

> *Any criterion employed to assess the effect of class size is in actuality assessing the accomplishments of some method—the method of teaching which was used in the study in question. Whether it appears to better advantage in large classes or in small classes depends upon the compatability of the method with the size of the groups being investigated (p. 142).*

Curiously, this view of the role of methodology and the organization of students and teachers for instructional purposes seems just the reverse of what logic and psychology would suggest. Vincent's remarks imply that the method selected for instruction should be compatable with the size of the class group in question. When students and teachers are organized in traditional class groups and in traditional depart-

mentalized patterns, this may well be an advisable and perhaps essential approach to take. It is because this approach was perceived to be contrary to the logic and the psycho-logic of learning that contemporary trends toward size variability in the organization of students for instruction took root in the last decade, particularly in elementary schools. The traditional paradigm of instruction began with a given class size, 25 or 30 students per teacher. This structure in large part determined the methods that were viable, and those in turn delimited the educational objectives that were feasible. The reconstruction of this pattern, through the teaming of teachers and the non-grading of schools, placed educational objectives in the prime position as the determinate of the most suitable instructional strategy for which a particular size class group could then be designated. As Scriven (1971) suggests:

> *Reduction of class size has often had disappointing results and this has been attributed to failure to adjust teaching methods to the smaller size. But this is an empty refuge unless a) teachers know exactly what the adjustment involves, and b) the adjustments have been shown to yield significant gains. This is clearly the case for a new "point of entry," e.g., questioning the basis for class grouping (age/ability, heterogeneity), ... (p. 52).*

By these remarks Scriven seems to mean that the point in the teaching paradigm for the insertion of the variable of class size ought most preferably to be at the end of the decision sequence rather than at the beginning.

The case for class groups of varying size continues to gain ground. Holland and Galfo (1964) hold that "the best hope for the future is to provide the students with opportunities to learn in both large and small groups, the selection of group size being determined by the teaching objectives" (p. 21). Even Furno and Collins (1967) in the midst of their study recognized the appearance on the instructional scene of numerous professional supporting staff and paraprofessional personnel, together with team teaching, television, and various instructional innovations and perceived that "the inclusion of

these parameters complicates the traditional concept of class size that has distinguished mass education in America since its inception" (p. 8). The platform of the Association of Classroom Teachers, written in 1962, specifies that "there should be maintained a teacher/pupil ratio of 1-25 based upon persons actually engaged in classroom teaching and the total student enrollment, that class size should not exceed 30 students per teacher, and that school-day schedules should provide adequately for lesson planning and pupil counseling" (Varner, 1968, 35-36). This position is somewhat anachronistic in the light of the classroom trends a decade later.

Dr. Robert Anderson of Harvard is a recognized pioneer in the promotion of team teaching and of size variability in instructional groups. Commenting on the question of class size, he states:

> *Over the years, educators came to regard as desirable a ratio of one teacher to every 20 or 30 children. And somewhere along the way a mystique began to develop around those numbers, not only in relationship to the teacher's capacity but also in relationship to the morale and health of the pupil group itself. Soon educators began to impute all sorts of interpersonal and social advantages to the class size that had proved (for altogether different reasons) to be practical, and the class of 25 became acceptable as ideal. . . . . Available data suggests, however, that class groups of 20 to 30 may in fact be among the least desirable and the least efficient of all possible sizes!" (1966, pp. 36-37).*

Anderson proposes that the size of the instructional group should depend upon "1) the nature of the lesson and the conditions under which it can be presented and 2) the number of children within the potential total audience for whom the lesson in question is assuredly relevant" (p. 39). He cites J. Lloyd Trump as recommending, for the secondary school in particular, that about 40 percent of the student's time be spent in large classes, another 40 percent in individual study, and 20 percent in small-group discussion. For elementary and

middle school, Anderson seems to accept the following approximate time allotments:

1.	Independent pupil activities	20-25%
2.	Teacher and pupil in a tutorial relationship	5%
3.	Working, interacting groups (5 to 8 pupils)	25%
4.	Discussion, decision-making groups (9-15 pupils)	30%
5.	Large-group lessons	15-20%

The bulk of recent research and authoritative opinion strongly contradicts the notion that classes of a particular size are optimal for effective instruction. The National Association of Secondary School Principals has recommended large-group instruction involving 100 or more pupils, small-group discussion for 12-15 pupils, and individual study for as few as 1-3 pupils (Varner, 1968, P. 33). Apparently reflecting the views of the National Education Association, Varner (1968) writes:

> *Recommendations for class size, teacher load, and/or numerical staffing adequacy are abundant. It appears, however, that flexibility, rather than rigid adherence to predetermined standards, is being emphasized more often (p. 33).*

In one sense, class size is considered to be more important than ever for effective instruction. It is the notion of a fixed optimum that now is generally held to be untenable.

D. TEACHER-ADMINISTRATIVE LOAD

The meaning of the term "teacher load" (or administrative load) appears to be reasonably well understood, even though the term encompasses a wide range of duties and responsibilities. In the case of the West Hartford Education Association vs. Dayson Decourcy, et al (Conn. Law Journal, No. 44), the definition of class size proposed in the stipulation to the Court as the number of pupils assigned to a class seems to have been accepted by the Court as reasonable. Sim-

ilarly, teacher load was accepted as meaning the number of teaching classes per day or per week and the number of different preparations per day or per week (p. 6).

In the paragraph that follows reference is made to extra-curricular activities as those generally outside the regular hours of pupil attendance at which teacher attendance is either required or voluntary, with or without additional pay. The Court ruled that the local Board of Education alone has the power to determine what extra-curricular activities will be held, if any. However, the assignment of teachers to such activities and the question of compensation for such extra-curricular activities were considered by the Court to affect salaries and other conditions of employment, and to that extent are mandatory subjects of negotiations.

The New York State Teachers Association (NYSTA, 1959) defined class load as the number of pupils for whom teachers are responsible daily where the teacher is assigned more than one class each day. It is interesting to note that neither of these two definitions of teacher load manifests an awareness of the number of out-of-class responsibilities that fall upon the elementary school teacher. Otto, et al (1954) compiled a list of over 150 different activities in which public school teachers, at one level or another, are expected to participate. A more recent compilation in the Negotiation Research Digest (1971, D-1) is reduced to about 45 duties and extra-curricular activities familier to, if not necessarily performed by, most school teachers. In addition to number of classes and number of preparations, many teachers are held responsible for cafeteria supervision, playground supervision, the loading of buses, the supervision of corridors, of sidewalks, of lavatories, and countless other responsibilities within and without the classroom.

From time to time it has been suggested that in some situations teacher load has a negative effect upon pupil achievement. Anderson (1950) questioned whether teacher load was a factor in student achievement. Through random selection, rapresentative classes were obtained from 56 Minnesota high schools. The number of pupils handled per day,

per teacher, in one-fourth of the schools, averaged 128 students. In the lower fourth of the distribution of schools, the number of pupils handled per day, per teacher, averaged 76 students. Holding intelligence and pre-test knowledge constant, the chemistry scores of these students in the final examinations in the 56 high schools were compared for significant differences. A difference, significant at the .05 level, in favor of the lower one-fourth of the distribution and the smaller teacher load was found. Similar findings emerged from a smaller companion study in 17 schools distributed over eight Midwestern states. Anderson concludes that school systems are justified in advocating lower pupil loads for teachers, in chemistry at least. The unfortunate flaw in this research is the failure to standardize the final examinations among the many high school classes in the sample so that the criterion of achievement would be uniform for the entire sample. The author's confidence in the similarity among the examinations cannot properly compensate for this shortcoming.

In the field of English, the National Council of Teachers of English have for some time urged that English teachers at the high school level be assigned four classes of not more than 25 students each. Otherwise, so the argument seems to run, the teacher is overloaded, particularly in the area of written composition, and is unable to correct and advise in a way that would enhance the writing achievement of the students. To date there appears to be only a few relevant items in the literature. One early example is the Smith (1931) study cited earlier on the question of class size in ninth grade English instruction. A second reference was also cited earlier (MASC Bulletin, 1972) announcing the disappointment of Dr. Kishkunas, former Superintendent of Schools in Pittsburgh, with the failure of students in English classes, taught by teachers with a four-class daily load, to learn to write significantly better than their counterparts elsewhere in the school system. The article contends that similar experiments in other cities tend to confirm Dr. Kishkunas' contention that small classes or reduced teaching schedules do not necessarily add up to a better education. At the present time the question of the ad-

vantages to students of a lightened teacher load in English instruction stands unanswered. Though not directly applicable, a study by Hopper and Keller (1966) of English students in junior college leads them to conclude that class size up to 56 does not seem to be a significant variable in the learning of writing skills.

The most common alternative for writing instruction involves the use of lay readers. Ford (1964) reported upon a study wherein six carefully screened college-educated people were selected to help English teachers read and grade themes. Experimental and control groups were matched for intelligence. The lay readers gave individual help to students in the experimental classes in terms of evaluative comments and one-to-one conferences on their theme writing. Students in the control groups merely received grades on their themes from the teacher or from the lay reader. After a three-year period, Ford concluded that all the reader-aided classes improved more in writing skills than did the control classes, and high intelligence students made the greatest gains. There were indications that students who were given help via the teacher aides wrote more and were more interested in their writing. The teachers reported that they had more time to give individual help to students, to seek professional improvement, and for lesson planning.

The determination of suitable teacher load for any subject or any grade level would appear to be a somewhat arbitrary decision in the absence of any valid or reliable research data to sustain specific criteria. Reasonable judgment in the light of contemporary standards and the guidelines in current practice may be the best and the only sources of guidance. In the matter of class size for regular teachers in the elementary and secondary schools, the preponderant pupil/teacher ratio for the nation ranges between 25:1 and 30:1. At the elementary school level, the ratio of pupils to teacher falls below 25 in only 7 percent of the cases; at the secondary level, the ratio falls below 25 in only 10 percent of the cases (NRD, 1972). In the State of Connecticut the medians of average class sizes for school enrollments ranging from 1,000 to 2,500

are at the elementary level 24.2, at the middle school level 23.1, and at the high school level 16.8 (CAASA, 1972).

The following are selected national data pertinent to teacher load (NEA Research Bulletin, 1971, p. 4; 1972, p. 1):

Secondary teachers:

Mean number of pupils taught per day	134
Mean number of periods taught per day	5
Mean number of unassigned periods	5
Median number of unassigned periods	5

Weekly workload:

Elementary teachers, required hours	36
Secondary teachers, required hours	37
Elementary teachers, non-compensated duties, hours	8
Secondary teachers, non-compensated duties, hours	8

Teacher aides of their own:

Elementary teachers	8.7%
Secondary teachers	2.1%

Aides shared with other teachers:

Elementary teachers	34.5%
Secondary teachers	14.2%

Teachers who eat lunch with pupils:

Elementary teachers	40.5%
Secondary teachers	19.6%

A complete discussion of negotiation agreements as they concern non-instructional service duties will be found in the Negotiation Research Digest, 1971.

An interesting device, the Frost Teaching-Load Formula, for assessing the relative work load of each teacher in the school system was described in detail by Otto (1954). In this formula, teaching load as expressed in clock hours of service per week is measured in terms of 1) the assigned hours and minutes of duty each week including teaching and other duties, 2) the number of preparation hours and minutes per

week, 3) any exceptional pupil load imposed upon the teacher, and 4) extra grades or study hall responsibilities. The formula takes class size into account as a factor in teaching load, and with modification of the numbers in the formula to conform with contemporary standards, it should be applicable to present-day practice. While it is doubtful that the Frost Formula would constitute a very practical way of determining just and equitable teaching loads for current purposes, it does illustrate the feasibility of formula-like plans when extensive specification of teacher responsibilities becomes necessary.

E. CLASS SIZE AND TEACHING LOAD AS SUBJECTS FOR NEGOTIATIONS

The law in Connecticut is clear that class size and teacher load are mandatory subjects for negotiation between school boards and teacher representatives (Conn. Supreme Court, *West Hartford Education Association v. Dayson DeCourcy, et al,* 1972). For purposes of that Court decision, "class size" was defined as the number of pupils assigned to a class. "Teacher load" was defined as the number of teaching classes per day or per week and the number of different preparations per day or per week. In the analysis that follows, references to class size will also apply to teacher load.

The significance of calling something a mandatory subject for negotiation simply means that the local Board of Education must discuss the proposal in good faith. In so discussing a proposal, the local Board of Education has available to it several reasonable responses.

First, the Board may answer the proposal with a firm rejection, or "no." In that event, it is important that the Board at least extend the courtesy of hearing the proposal, discussing its ramifications, and explaining the reason for the Board's rejection. The objective of this approach would be to exclude any statement on class size, however innocuous, from the written agreement. Strictly from the perspective of management, this alternative is preferable in that it will a) insure

maximum flexibility in modifying programs and staffing structure, b) avoid possibility of grievance based upon class size complaints, and c) avoid future financial burdens in the event changed conditions require deviation from a specific class size standard. However, these benefits must be carefully weighed against the impact on teacher morale and Board-Association relations. If the Board chooses this alternative, its negotiators should express a willingness to negotiate the Association's proposal in good faith, but firmly reject it as a contract item for the following reasons:

a) Although we, the local Board of Education, concede that the *West Hartford* decision recognizes class size as a mandatory subject for negotiation in Connecticut, it is important to note that decisions of courts in other states are not uniform on this point. This clearly indicates that the judiciary has not uniformly accepted the propriety and wisdom of including class size provisions in formal written contracts. Although we will negotiate class size, we feel that it is not an appropriate subject for inclusion in the written contract.

b) The concept of optimum class size cannot be isolated and determined in a vacuum. In fact, it is the product of many other important decisions that must be made by the Board and superintendent on such issues as curriculum, staffing arrangements and patterns, availability of personnel and facilities, budgeting constraints, programs and types of instruction, and in short, considerations of school management in its totality.

c) If the Teachers' Association agrees that quality of education is determined in part by class size, then this decision should be preserved as a prerogative of management since the statutes clearly vest the Board with the responsibility of making educational policy decisions.

d) The inclusion of a class size provision in the contract, however generally it may be worded, will impose restrictions on the Board in its efforts to develop and implement innovative programs of instruction which may, by

their nature, require deviation from traditional concepts of the "classroom."

Secondly, the Board may reject the proposal as a contract item, but resolve any established problems by unilaterally promulgating a Board Policy on class size. The major advantage to the Board Policy approach is the reservation of exclusive management rights to modify the policy as changing conditions may warrant.

It is recommended that the policy be adopted prior to presentation of a class size proposal by the Teachers' Association in order to avoid any claims of "bad faith." Policy on class size should be made only after consultation with the teacher staff, however. The objective here is not to prevent teacher input on class size decisions, but to preserve flexibility in decision-making.

Third, the Board may either accept the teacher proposal or offer a counter-proposal for inclusion in the Agreement. In descending order of preference, the following types of counter-proposals are recommended:

a) A general statement to the effect that "the Board and Association agree, in principle, that a reasonable class size is desirable, but that decisions of the Board on class size shall not be subject to the grievance procedure."

b) An agreement that "the Association may call to the attention of the Board if, in the Association's judgment, class sizes substantially exceed a reasonable number. The Board would review the complaint and cure any unreasonable excesses the Board finds to exist." Although the parties may have clearly understood their intention when the agreement was drafted, the clause may some day be the subject of a breach of contract action of subject to review by a grievance arbitrator.

c) The Board might agree to a definite number as desirable class size. If this alternative is chosen, the Board can protect its flexibility to a certain extent by stating the maximum class size only as a "desirable guideline for optimum class size."

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EPILOGUE

In the light of the research summarized and analyzed in this review, the designation of a single optimal class size or optimal pupil/teacher ratio is without foundation in fact. The widely accepted ratio of 25 students to one teacher or to one classroom rests upon experience, intuition, and practice. In empirical research, however, the number 25 has no more educational validity than do the numbers 20 or 30. Nonetheless, some judgment must be made about an appropriate ratio of students to teacher or classroom whenever the former outnumber the latter. Indeed, the judgment is always made, either specifically or tacitly, once the school year is under way. Because there is little or no valid and reliable research on the matter, consultants from outside a school system are no better equipped to adjudicate a proper class size or pupil/teacher ratio than are the authorities, administrators, and educators in the local system. This is equally true of the issues surrounding the teacher or administrative work load. However, on the basis of national and state practice it appears that the school system that consistently arranges a class size or pupil/teacher ratio at or below 25:1 is providing learning conditions for students and teachers as favorable as those enjoyed in the vast majority of communities in the United States.

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